Electronic supplementary information for

Dendrite-free zinc metal anodes enabled by electrolyte additive for high-performing aqueous zinc-ion batteries

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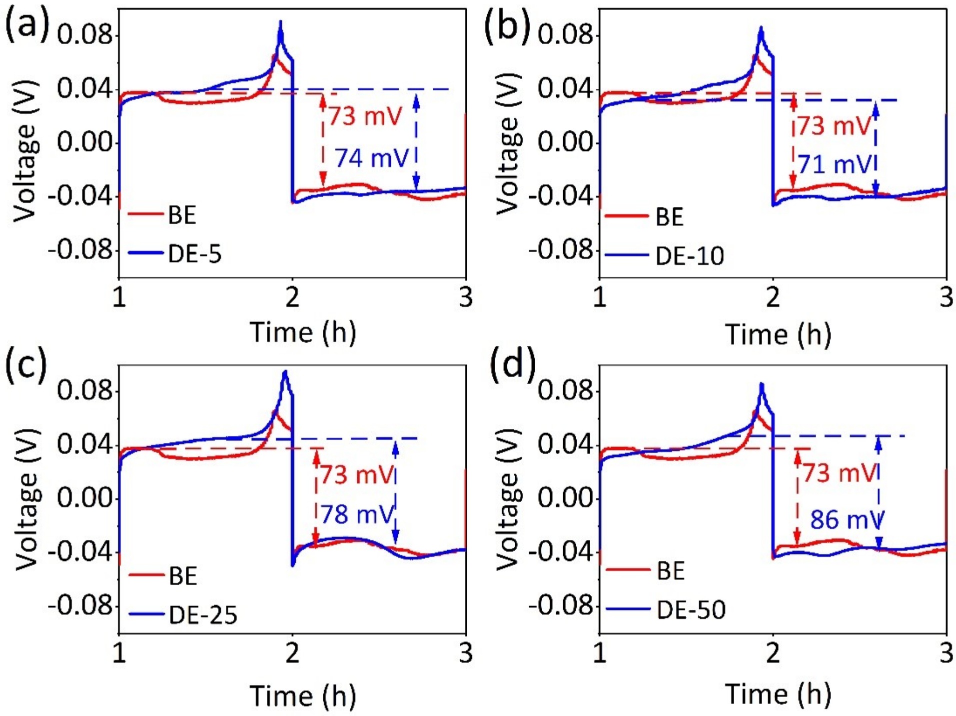

Figure S1. The initial overpotential profiles of Zn symmetrical cells with a current density of 1 mA cm $^{-2}$ in different battery systems.

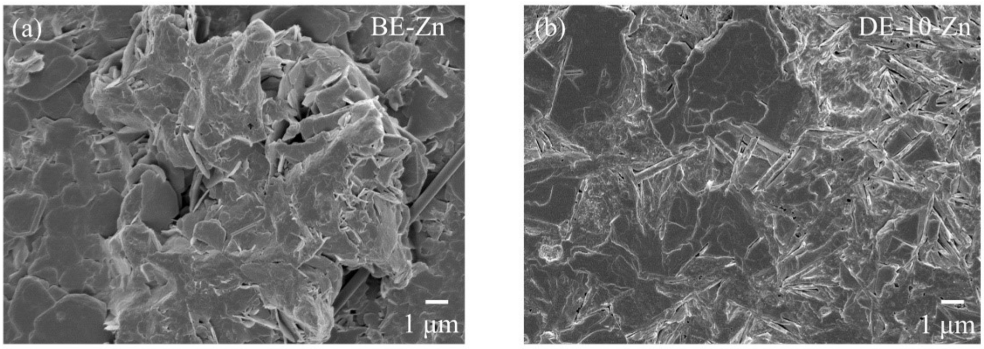

Figure S2. Morphological and structural characterizations of Zn^{2+} plating behavior.

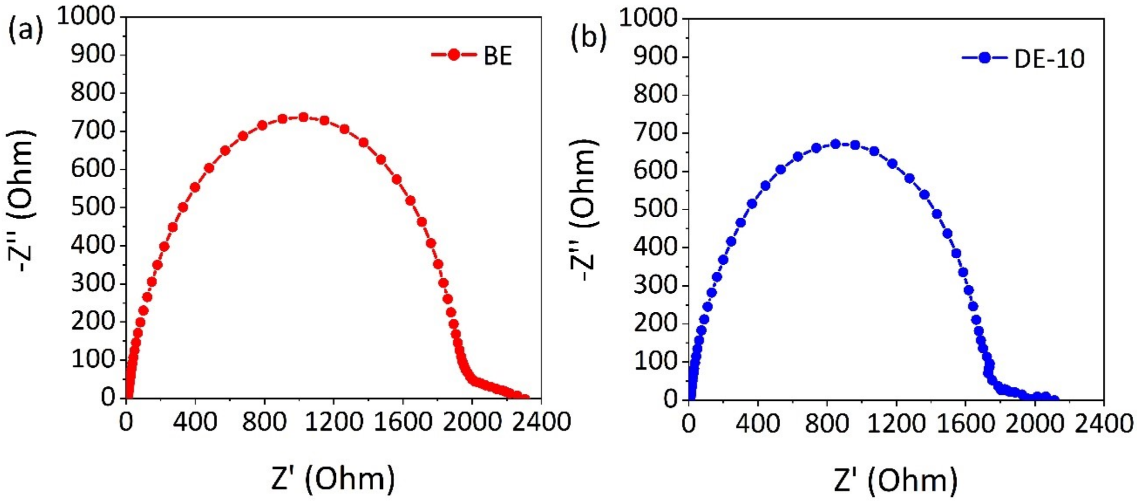

Figure S3. Figures (a) and (b) correspond to the initial EIS spectra the Zn symmetric cells in the baseline and DE-10 designed electrolytes, respectively.

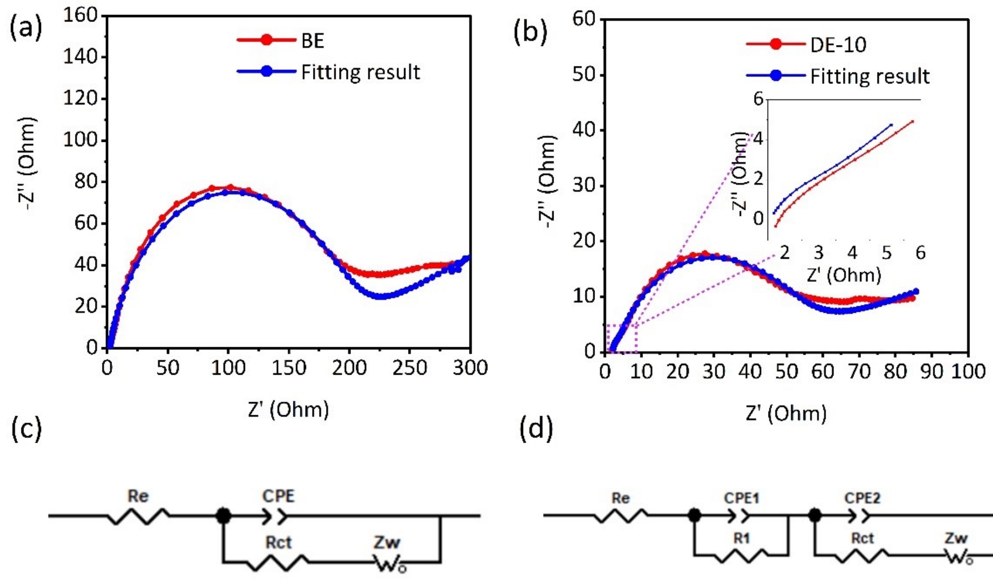

Figure S4. The interface impedance fitting results of zinc anode electrode; Figures (c) and (d) correspond to their equivalent circuits, respectively.

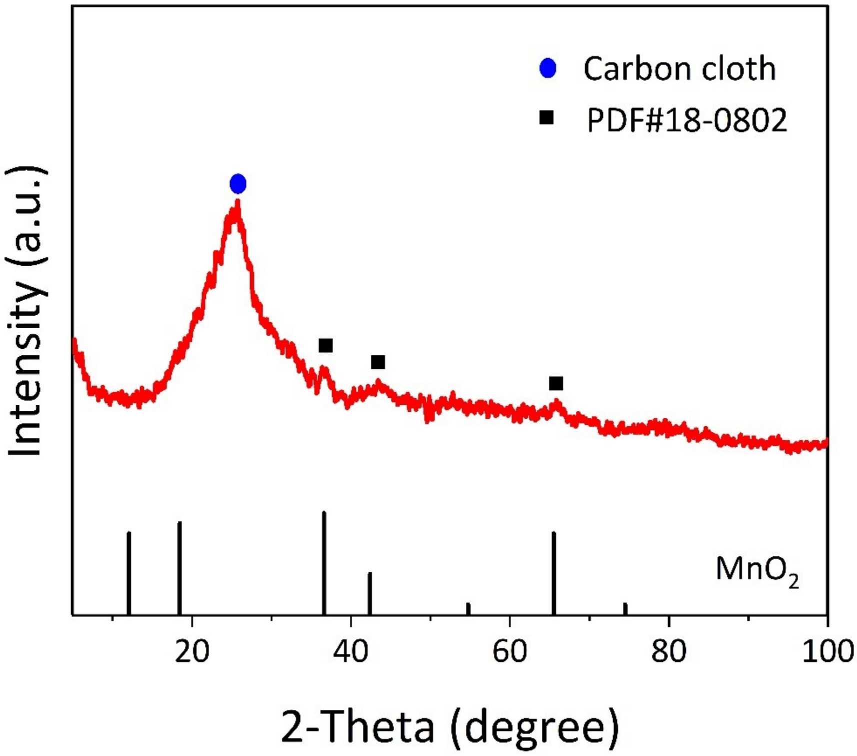

Figure S5. XRD image of MnO_2.

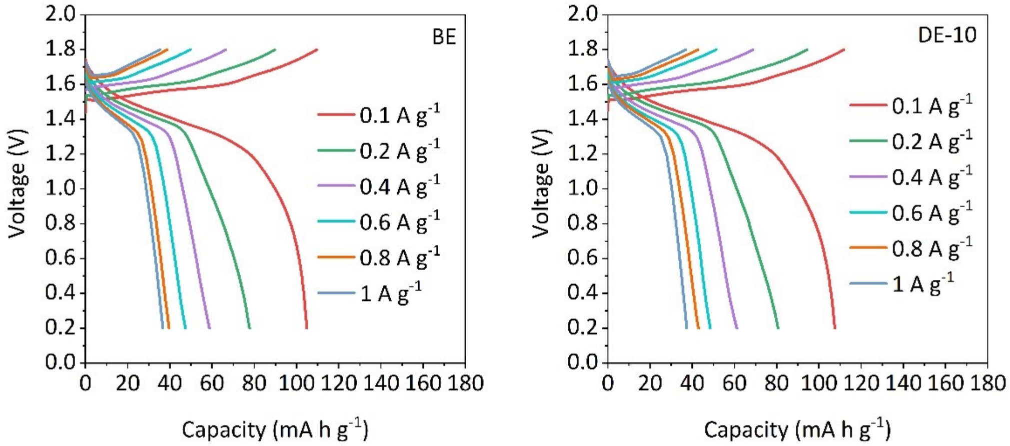

Figure S6. The typical voltage profiles of the Zn//MnO_2 battery in the baseline and designed electrolytes at different current density.

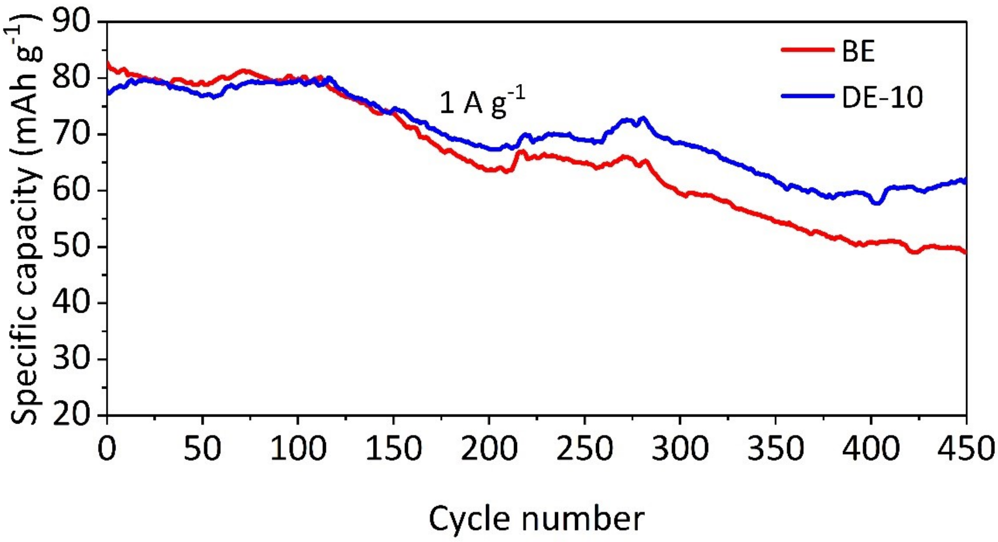

Figure S7. The cycling performance of Zn//MnO_2 battery in the different electrolytes at 1 A g^{-1}.

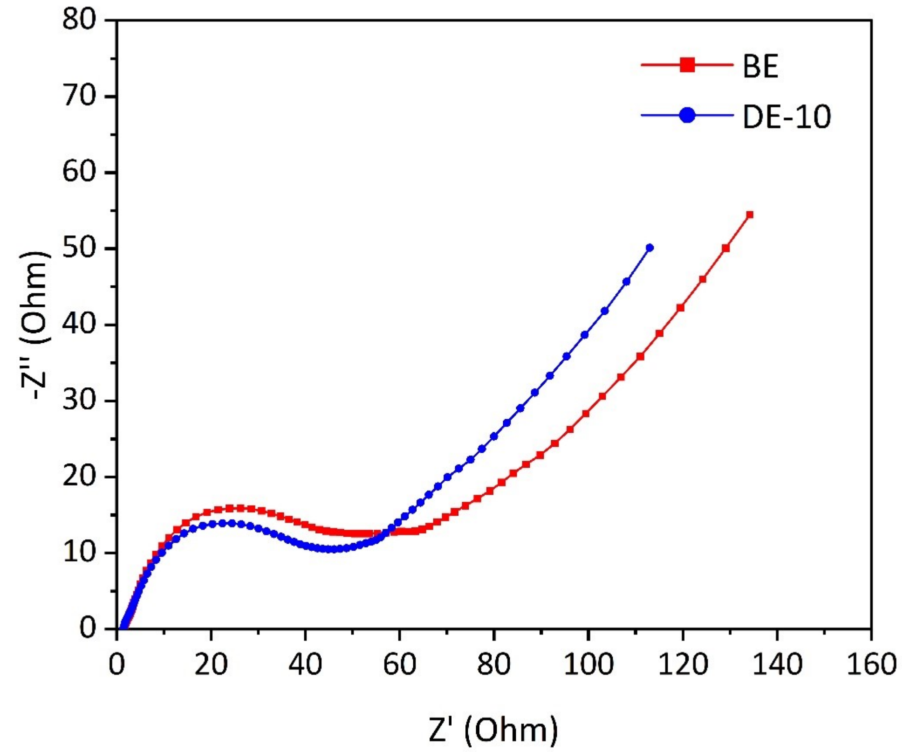

Figure S8. The EIS spectra of Zn//MnO_2 battery in the baseline and DE-10 designed electrolytes, respectively.

Table S1. The viscosity of DE-5, DE-10, DE-25 and DE-50 electrolytes.

Electrolytes	DE-5	DE-10	DE-25	DE-50
Viscosity (Pa.s)	1.847×10^{-3}	1.827×10^{-3}	1.833×10^{-3}	1.836×10^{-3}

The test principle of the Ubbelohde viscometer is as follows: The outflow times of the standard solution and the solution to be tested were determined with the same viscometer under constant temperature. Assuming that the outflow time of the standard solution and the solution to be tested are a and b, respectively, the relative viscosity of the solution can be expressed as:

$$\eta = \frac{\rho t}{\rho_0 t_0}\eta_0$$

Where, ρ and ρ_0 are the densities of the solution to be assayed and standard solution respectively; η_0 is the viscosity value of the standard solution at the experimental temperature. In this experiment, aqueous solution was used as the viscosity reference material, and the viscosity (0.890×10^{-3} Pa.s) of the aqueous solution can be found in the manual.